Amendments to the Claims

Kindly amend claims 1, 5, 6, 9 & 16, and cancel claims 2, 4 & 15 (without prejudice), as set forth below. All pending claims are reproduced below, with changes in the amended claims shown by underlining (for added matter) and strikethrough/double brackets (for deleted matter).

1. (Currently Amended) A method of monitoring coolant within a cooling system, the method comprising:

employing at least one pressure transducer to facilitate obtaining multiple pressure measurements related to an amount of coolant within an expansion tank of the cooling system;

determining a rate of volume change of coolant within the expansion tank employing the multiple pressure measurements;

determining whether the amount of coolant within the expansion tank of the cooling system is increasing or decreasing due to a cooling system defect; [[and]]

automatically determining type and immediacy of action to be taken to service the cooling system responsive to a comparison of a magnitude of the rate of volume change of coolant within the expansion tank to multiple predefined leak rate set points, and to the determining whether the amount of coolant within the expansion tank of the cooling system is increasing or decreasing;

wherein the employing comprises obtaining successive pressure measurements related to the amount of coolant within the expansion tank of the cooling system, the successive pressure measurements being taken at a known time interval, and wherein the determining comprises employing the successive pressure measurements at the known time interval to determine the rate of volume change of coolant within the expansion tank; and

further comprising automatically determining whether the magnitude of the rate of volume change of coolant within the expansion tank is less than a first leak rate set point, and if so, continuing monitoring of coolant within the cooling system, otherwise, determining whether the magnitude of the rate of volume change of coolant within the expansion tank is between the first leak rate set point and a second leak rate set point, and if so, and if the amount of coolant within the expansion tank is increasing, then signaling for corrective action to address the increase in the amount of coolant within the expansion tank.

2. (Canceled).

3. (Previously Presented) The method of claim 1, wherein the cooling system is a closed loop cooling system.

4. (Canceled).

5. (Currently Amended) The method of claim [[4]] 1, further comprising automatically determining whether the amount of coolant within the expansion tank is above a minimum volume threshold, and if not, signaling for the cooling system to be shut down, otherwise, continuing with monitoring of coolant level within the cooling system.

6. (Currently Amended) The method of claim [[4]] 1, further comprising automatically determining whether the rate of volume change of coolant within the expansion tank is greater than the second leak rate set point, and if so, signaling for immediate action to be taken to service the cooling system, wherein the immediate action to be taken is dependent upon whether volume of coolant within the expansion tank is increasing or decreasing.

7. (Original) The method of claim 1, wherein the employing comprises automatically employing the at least one pressure transducer to obtain multiple differential pressure measurements on the amount of coolant within the expansion tank, each differential pressure measurement comprising a difference in pressure between pressure in a liquid coolant portion of the expansion tank less pressure in a non-liquid portion of the expansion tank.

8. (Original) The method of claim 7, wherein the at least one pressure transducer comprises a differential pressure transducer for determining the multiple differential pressure measurement.

9. (Currently Amended) A system for monitoring coolant within a cooling system, the system comprising:

at least one pressure transducer coupled to an expansion tank of the cooling system, wherein the at least one pressure transducer facilitates obtaining multiple pressure measurements related to an amount of coolant within the expansion tank;

means for determining a rate of volume change of coolant within the expansion tank employing the multiple pressure measurements;

means for determining whether the amount of coolant within the expansion tank of the cooling system is increasing or decreasing due to a cooling system defect; [[and]]

means for automatically determining type and immediacy of action to be taken to service the cooling system responsive to a comparison of a magnitude of the rate of volume change of coolant within the expansion tank to multiple predefined leak rate set points, and to the determining whether the amount of coolant within the expansion tank of the cooling system is increasing or decreasing; and

wherein the means for employing comprises means for automatically employing the at least one pressure transducer to obtain multiple differential pressure measurements on the amount of coolant within the expansion tank, each differential pressure measurement comprising a difference in pressure between pressure in a liquid coolant portion of the expansion tank less pressure in a non-liquid portion of the expansion tank.

10. (Original) The system of claim 9, wherein the at least one pressure transducer obtains successive pressure measurements related to the amount of coolant within the expansion tank of the cooling system, the successive pressure measurements being taken at a known time interval, and wherein the means for determining comprises means for employing the successive pressure measurements at the known time interval to determine the rate of volume change of coolant within the expansion tank.

11. (Previously Presented) The system of claim 9, wherein the cooling system is a closed loop cooling system.

12. (Previously Presented) The system of claim 10, further comprising means for automatically determining whether a magnitude of the rate of volume change of coolant within the expansion tank is less than a first leak rate set point, and if so, for continuing monitoring of coolant within the cooling system, otherwise, for determining whether the magnitude of the rate of volume change of coolant within the expansion tank is between the first leak rate set point and a second leak rate set point, and if so, and if the means for determining whether the amount of coolant within the expansion tank determines that the amount is increasing, then for signaling for corrective action to address the increase in the amount of coolant within the expansion tank.

13. (Original) The system of claim 12, further comprising means for automatically determining whether the amount of coolant within the expansion tank is above a minimum volume threshold, and if not, for signaling for the cooling system to be shut down, otherwise for continuing with monitoring of coolant level within the cooling system.

14. (Original) The system of claim 12, further comprising means for automatically determining whether the rate of volume change of coolant within the expansion tank is greater than the second leak rate set point, and if so, for signaling for immediate action to be taken to service the cooling system, wherein the immediate action to be taken is dependent upon whether volume of coolant within the expansion tank is increasing or decreasing.

15. (Canceled).

16. (Currently Amended) The system of claim [[15]] 9, wherein the at least one pressure transducer comprises a differential pressure transducer for determining the multiple differential pressure measurement.

17-20. (Canceled).

21. (Previously Presented) A method of monitoring coolant within a cooling system, the method comprising:

(i) employing at least one pressure transducer to facilitate obtaining multiple pressure measurements related to an amount of coolant within an expansion tank of the cooling system;

(ii) determining a rate of volume change of coolant within the expansion tank employing the multiple pressure measurements;

(iii) determining whether a magnitude of the rate of volume change of coolant with the expansion tank is less than a first leak rate set point, and if so, determining whether the amount of coolant within the expansion tank is greater than a preset maximum allowable, and if so, automatically signaling for corrective action to be taken on the cooling system, otherwise repeating the employing (i) and the determining (ii);

(iv) if the magnitude of the rate of volume change of coolant within the expansion tank is greater than the first leak rate set point, determining whether the magnitude of the rate of volume change of coolant within the expansion tank is greater than a second leak rate set point larger than the first leak rate set point, and if so, determining whether the amount of coolant within the expansion tank is increasing, and if so, automatically signaling for corrective action to be taken on the cooling system, otherwise determining that a fast coolant leak exists, and automatically initiating leak isolation protocol; and

(v) if the magnitude of the rate of volume change of coolant within the expansion tank is between the first leak rate set point and the second leak rate set point, determining whether the amount of coolant within the expansion tank is increasing, and if so, automatically signaling for corrective action to be taken on the cooling system, otherwise detecting existence of a slow leak in the cooling system, and determining whether the amount of coolant within the expansion tank is above a minimum allowable amount for operation of the cooling system, and if so, repeating the employing (i) and the determining (ii), otherwise automatically shutting down the cooling system.

22. (Previously Presented) The method of claim 21, wherein the cooling system is a closed loop system.

* * * * *